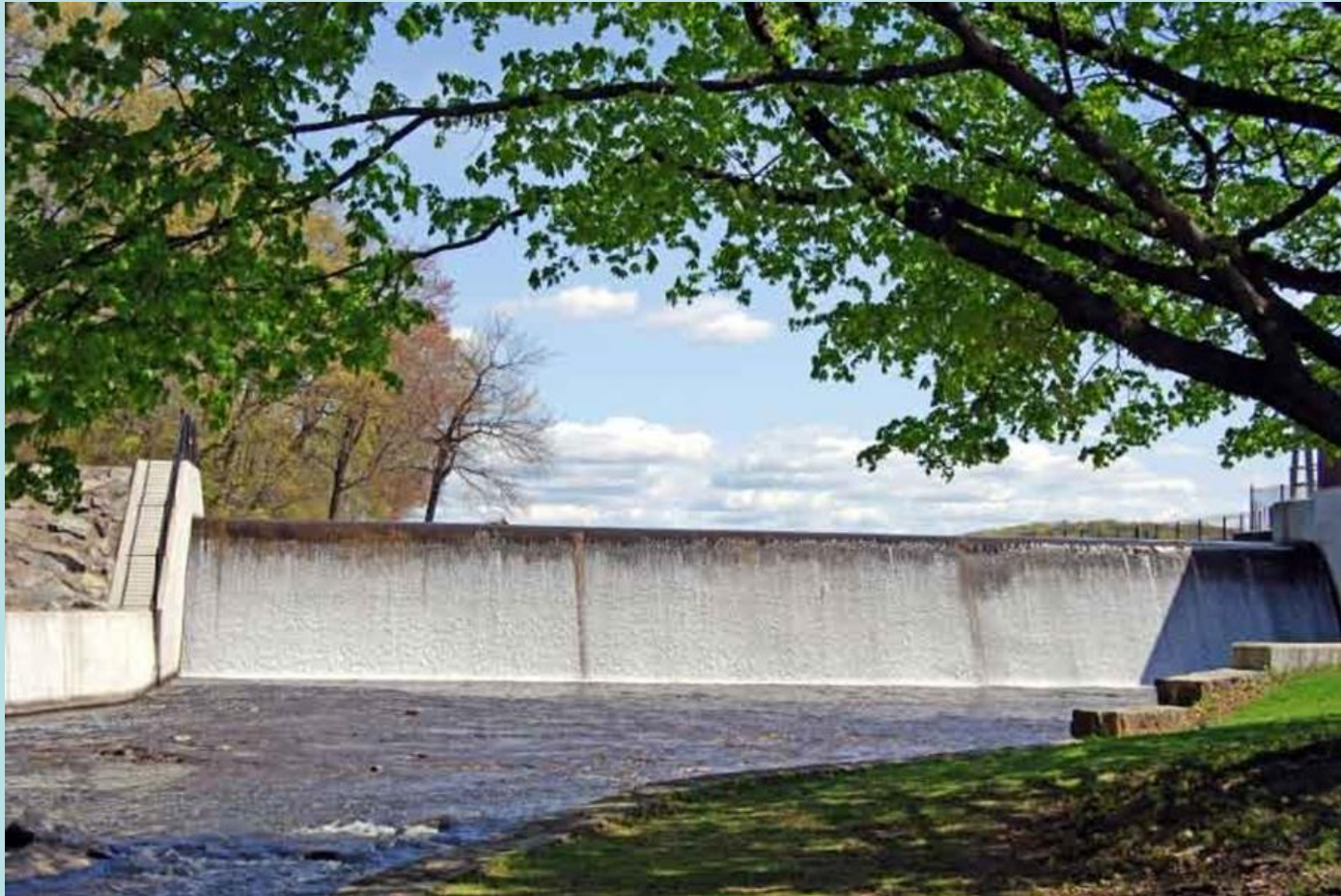


Lake Hopatcong Commission Meeting September 21, 2015



Lake Hopatcong Water Level Management Plan March 2011



Citizens Advisory Committee

- Representative from each of the 4 towns
- Lake Hopatcong Alliance
- Lake Hopatcong Commission
- Lake Musconetcong Regional Planning Bd
- Musconetcong Watershed Association

Conflicting Mandates

- Legislative – N.J.S.A. 13:12-5: Lake Hopatcong shall be used as an aquatic park and the lake level shall be maintained at the normal high water natural elements permitting.
- Judicial – 1922 Court Order in favor of Musconetcong Millers Assn. directs that a fountain be constructed to pass 12 CFS downstream at all times.

Goals of the Plan

- To protect the environmental health and the natural and scenic resources of Lake Hopatcong and the Musconetcong River System;
- Maximize recreational opportunities;
- Minimize the potential for damage to property and waterfront structures;
- Maintain the minimum flow required to sustain downstream resources.

Objective of the Plan

- Establish an easily understood management and operational guidelines for the manipulation of the Lake Hopatcong water control structure to maintain a lake elevation as near to 9 feet as possible between May 1st and November 19th conditions permitting.

Lake Concerns

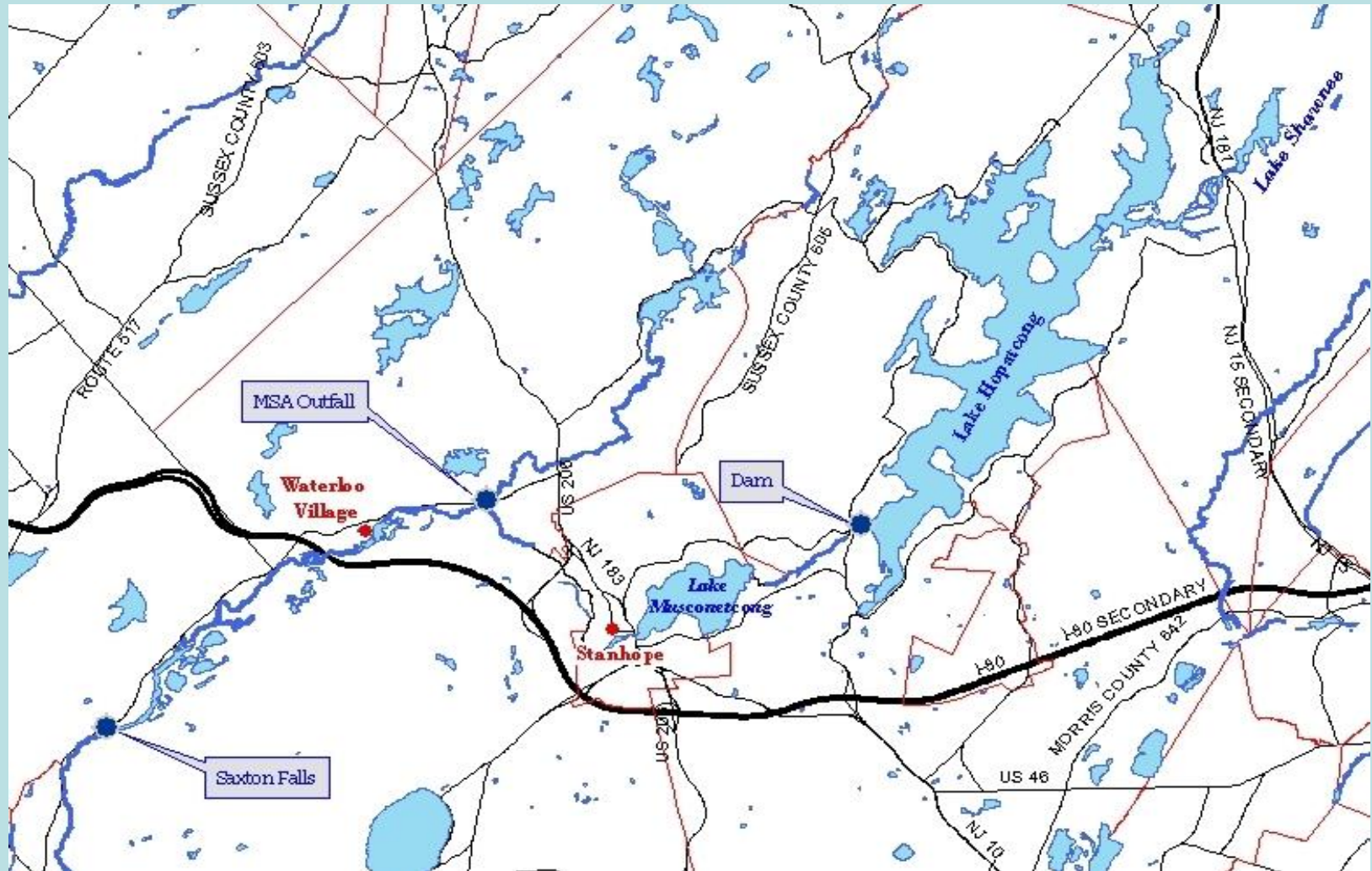
- Recreational boating use impaired at 7.5'
- 9.5' = No wake declaration
- Ice damage



Resource Considerations



Resource Management Considerations



Comparison 2000 – 2011 Plans

Issue	2000 Plan	2011 Draft
Passing Flow	12 CFS	12 CFS
Summer rules	Gates Pass 12 CFS Manage <9.5'	If spilling 12 CFS close gate Manage <9.5'
Departure	Drought	Drought or Lake 1' below

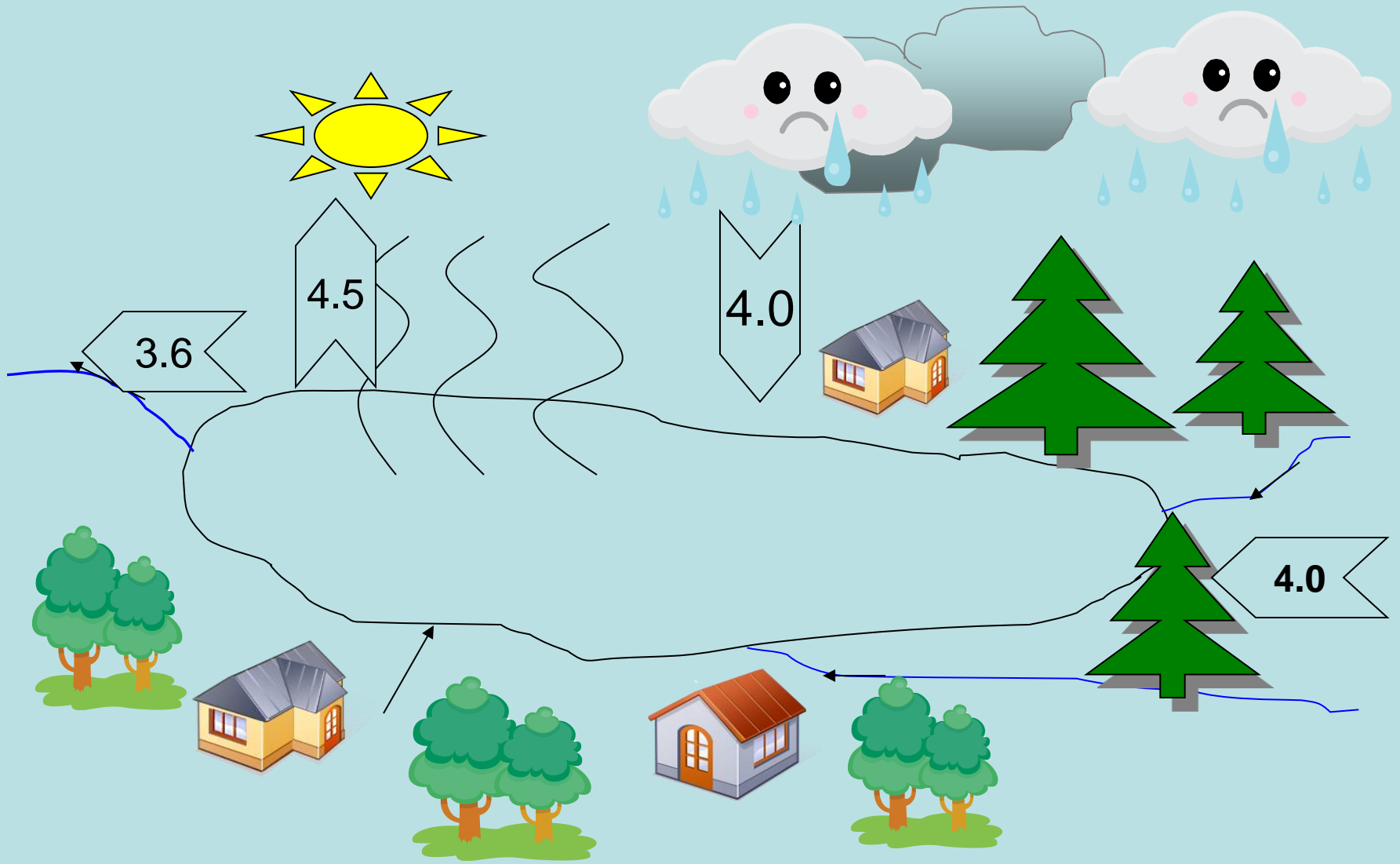
Comparison 2000-2011 Plans

Issue	2000 Plan	2011 Plan
Annual Drawdown	26 inches	26 inches
Start	November 1	About November 19
Complete	December 15	December 15
Rate	.75 inches/day	1 inch/day
Refill	Ice out or 3/15	Ice out

Comparison 2000-2011 Plans

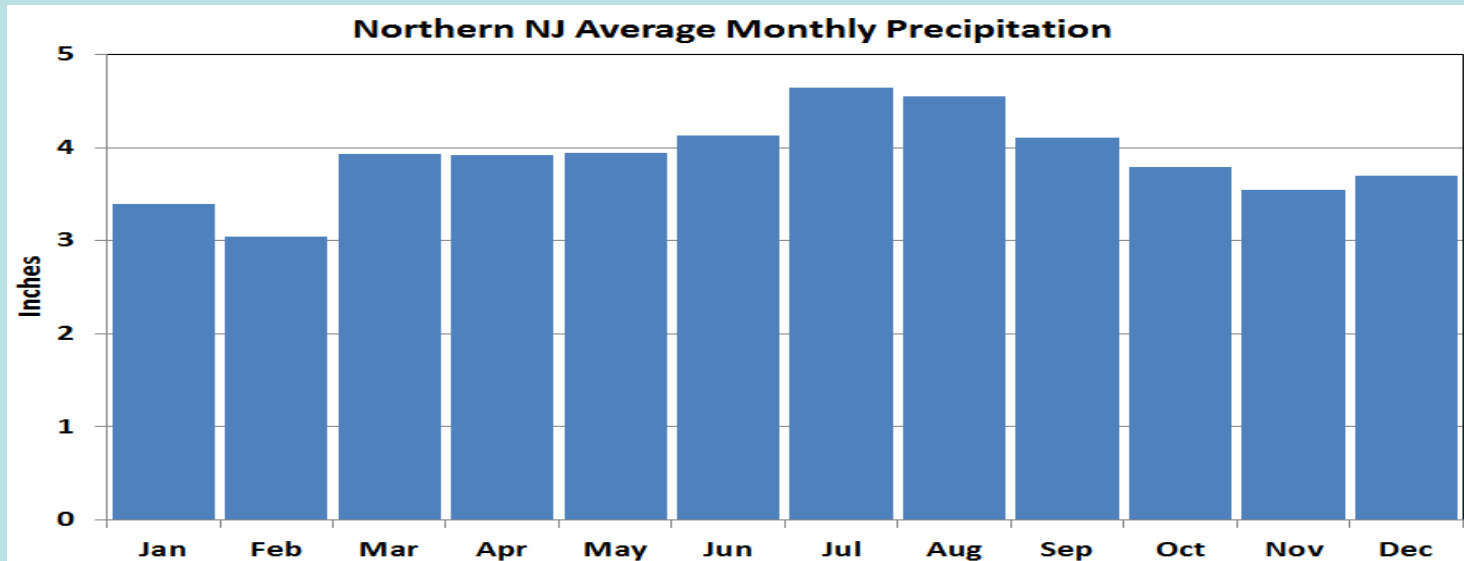
Issue	2000 Plan	2011 Plan
5-year Drawdown	5 feet	5 feet
Start	Day after Labor Day	About September 22
Rate	1 inch/day	1.5 inches/day
Complete	November 1	November 1
Refill	Dec. 15 or later refill between 12 and 48 inches	Dec. 15 refill as much as possible to w/in 26 inches

Lake Hopatcong Water Budget



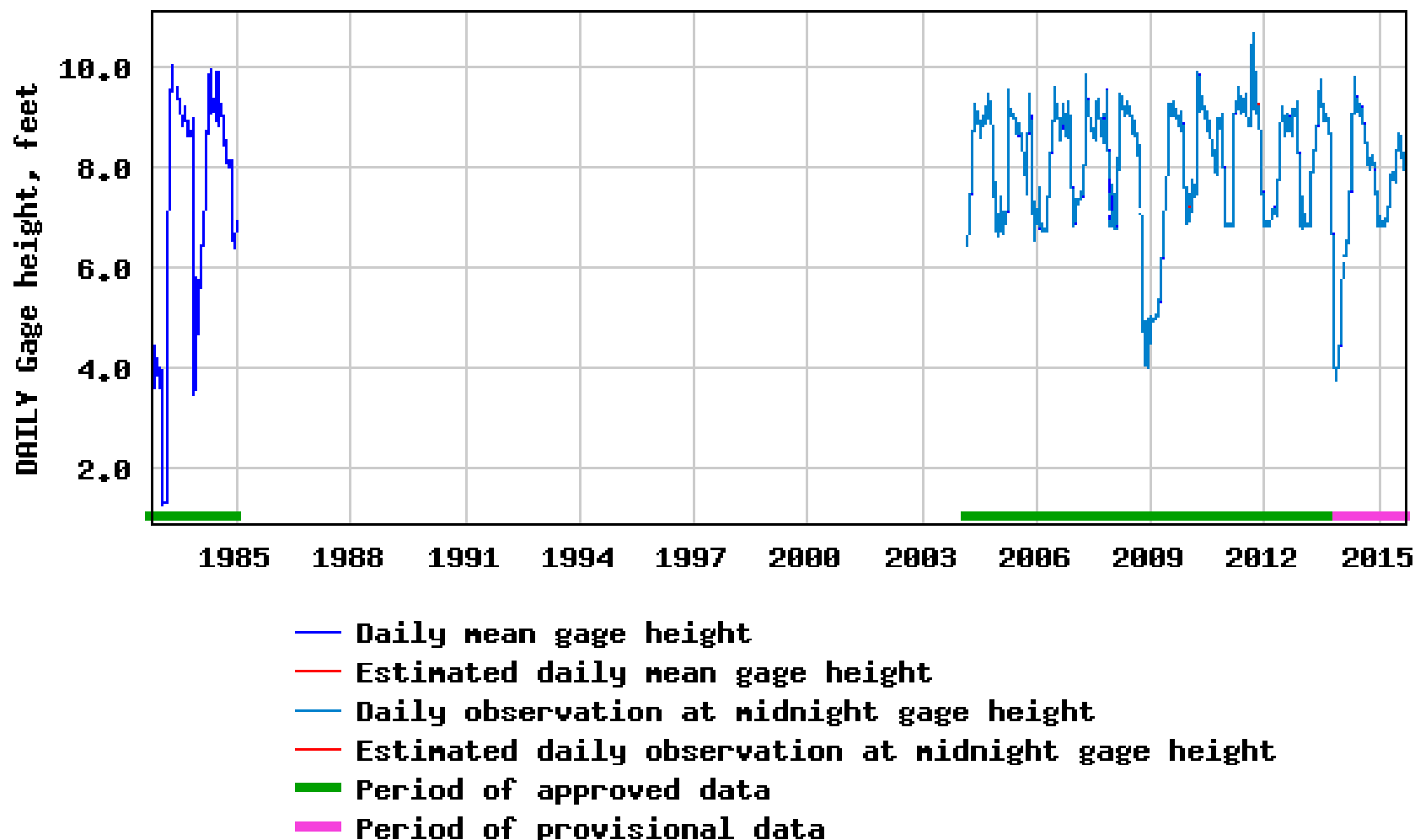
Lake Hopatcong

- Winter 1" rain → ~4" lake rise
- Summer 1" rain → ~2" lake rise



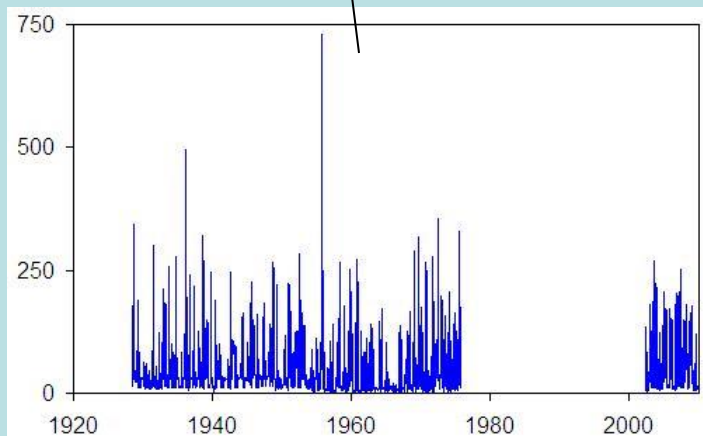
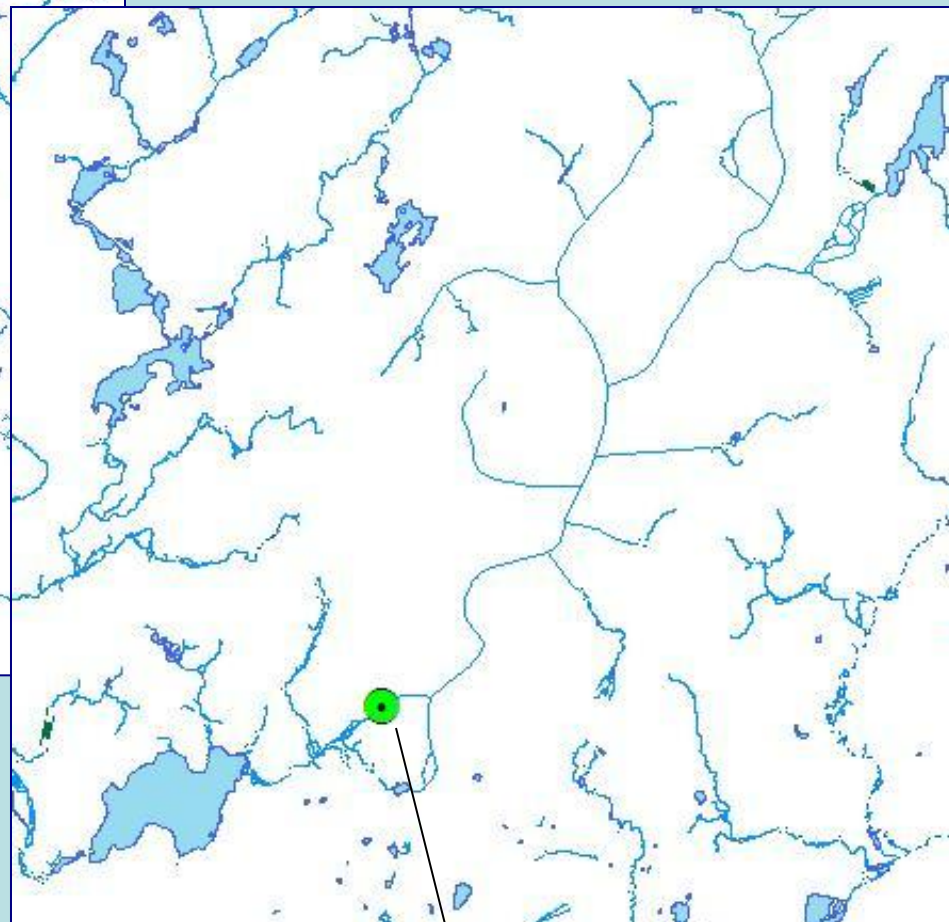
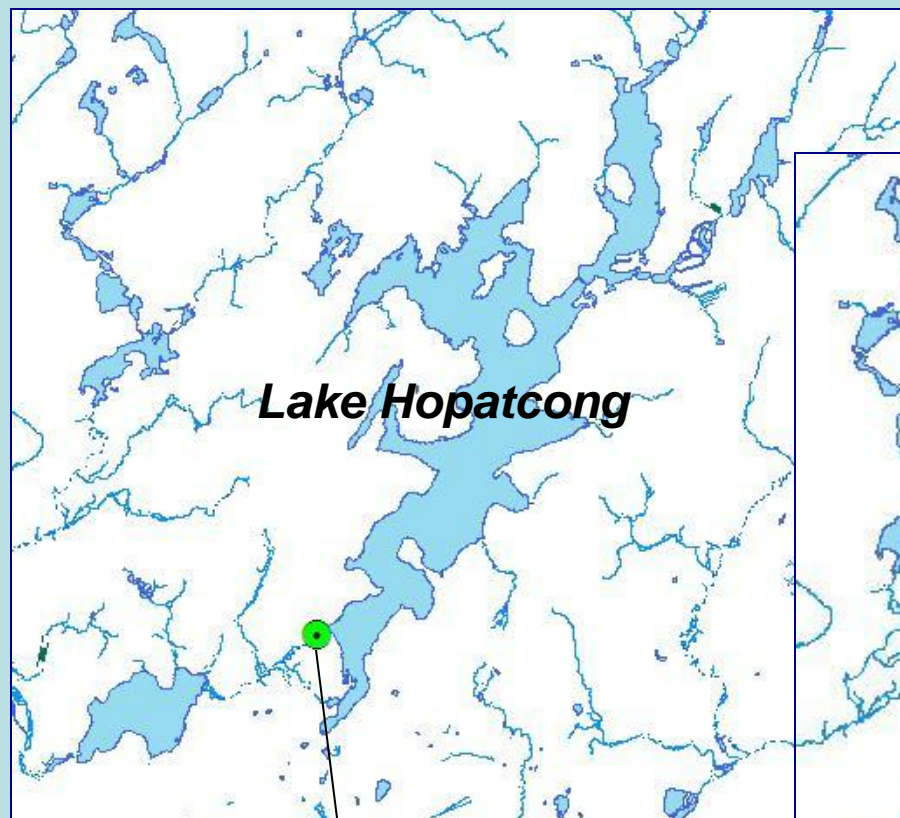
- Summer evaporation → ~6"/month lake decline
- 12 cfs release → 3.6 inches/month lake decline
- 8 cfs release → 2.4 inches/month lake decline

USGS 01455400 Lake Hopatcong at Landing NJ

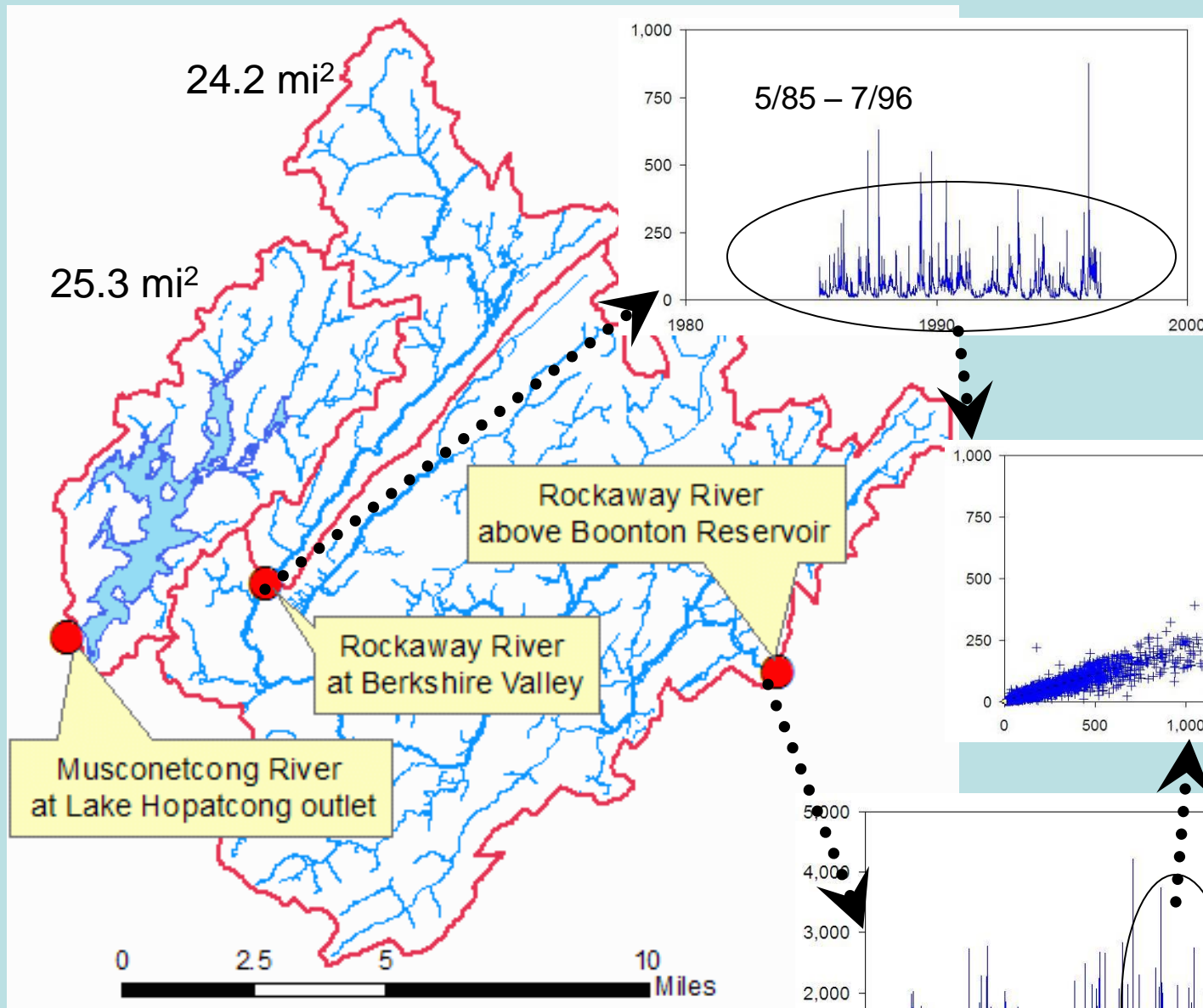


The water surface elevation is regulated by the Lake Hopatcong State Park in order to provide the residences and businesses along its banks with the opportunity to maintain and repair docks and other appurtenances and to prevent ice damage. Every year the lake is drawn down, by release through its gates, 2.5 feet below the top of the spillway. The drawdown usually begins November and lasts through December. This lake level is maintained through February to prevent ice damage to the surrounding docks. It is then allowed to fill back up which under normal conditions would take place during the month of March. Every five years the lake is drawdown five feet for maintenance purposes. More recently this drawdown occurred in 1960, 1965 and 1970.

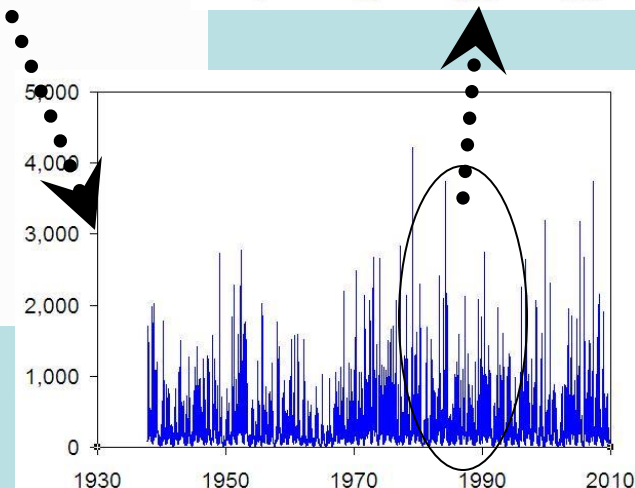
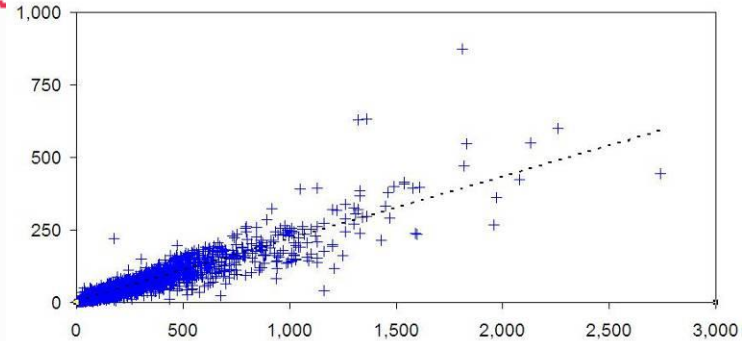
A minimum release from the lake to the Musconetcong River occurs through a recreational fountain 250 feet downstream of the dam. Under normal conditions the minimum release is 7.7 mgd. However, under specific drought conditions, this minimum is reduced to a flow of 4.0 mgd.



?

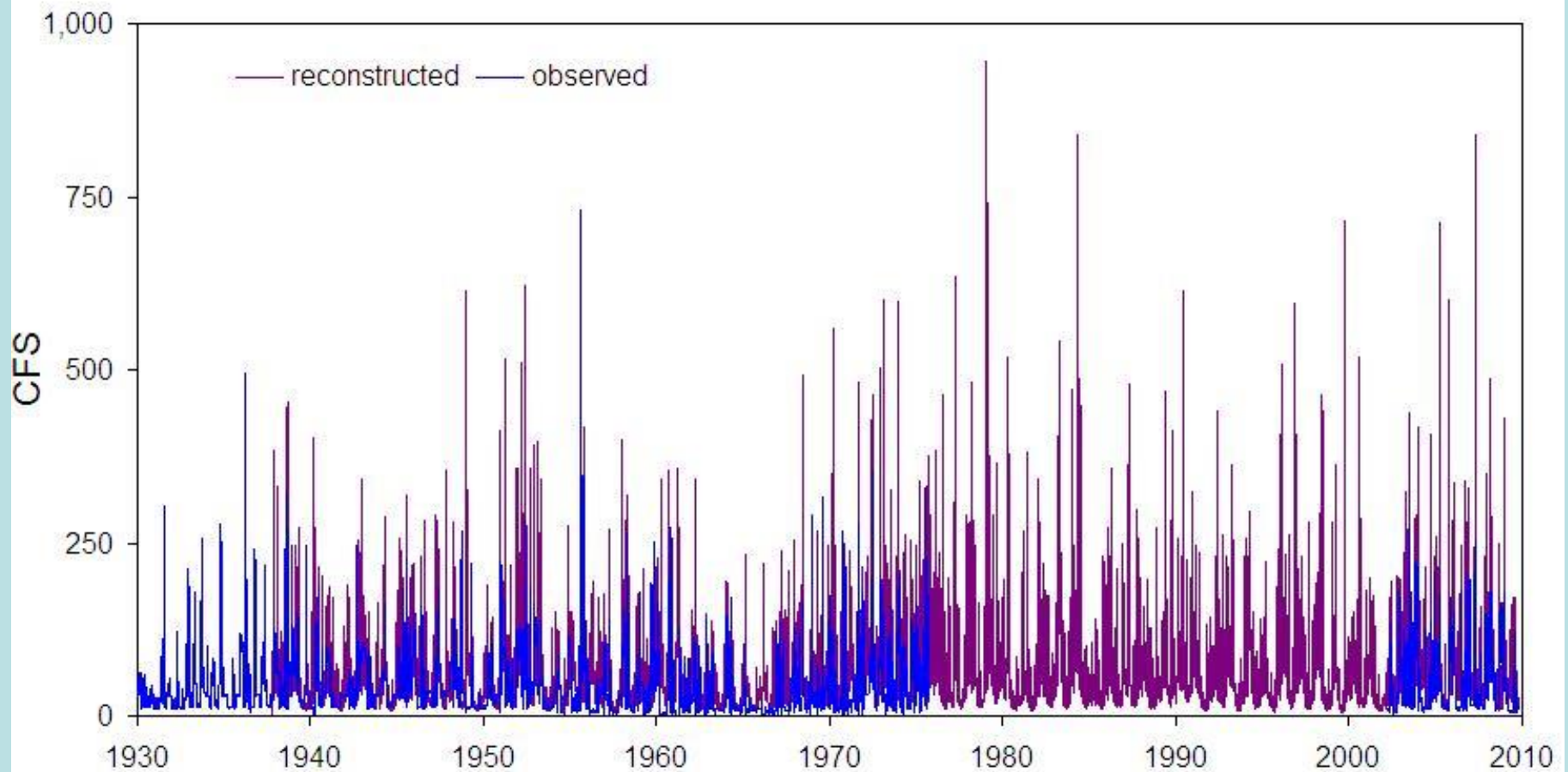


Observed Flows

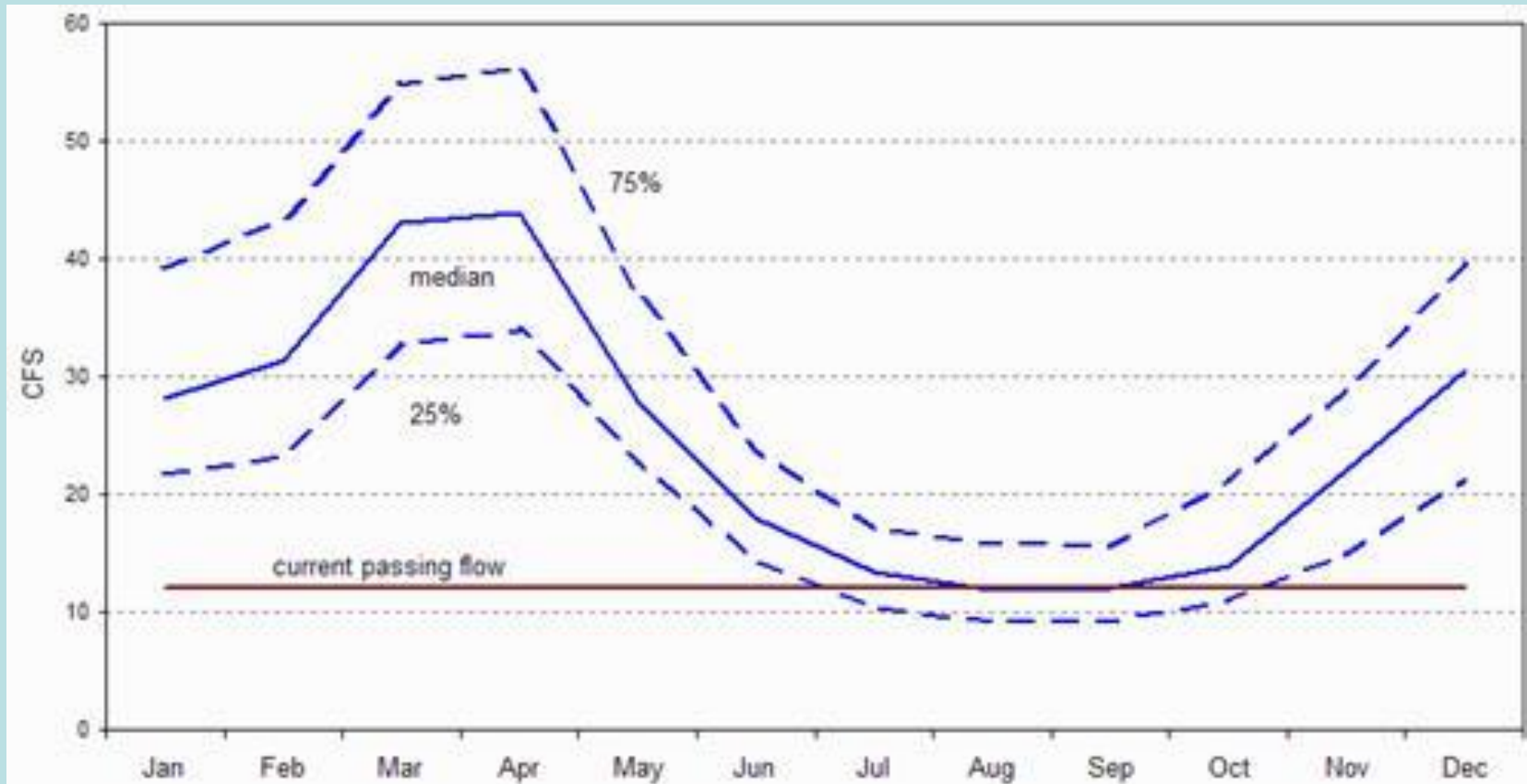


Flow Values

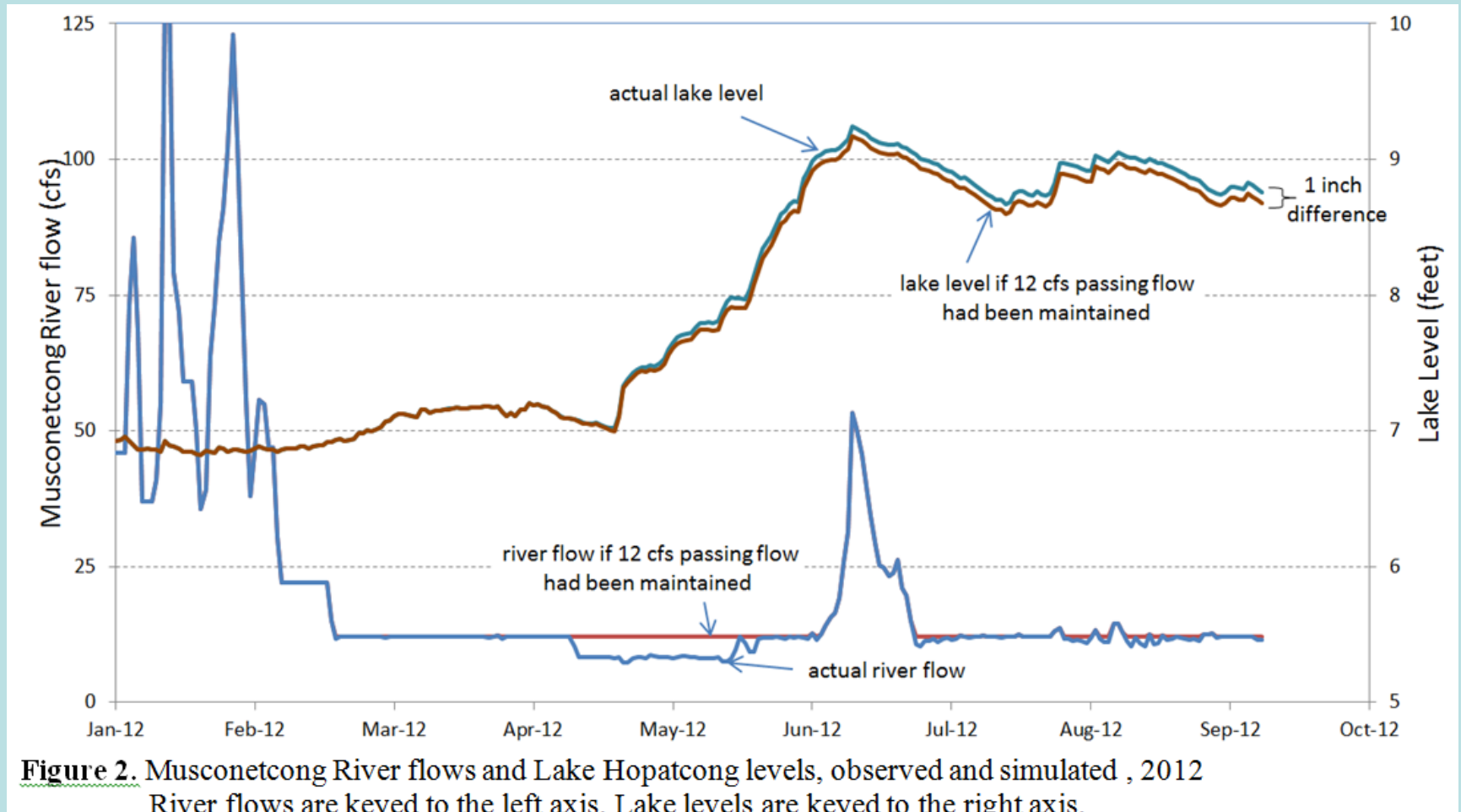
Musconetcong River at outlet of Lake Hopatcong

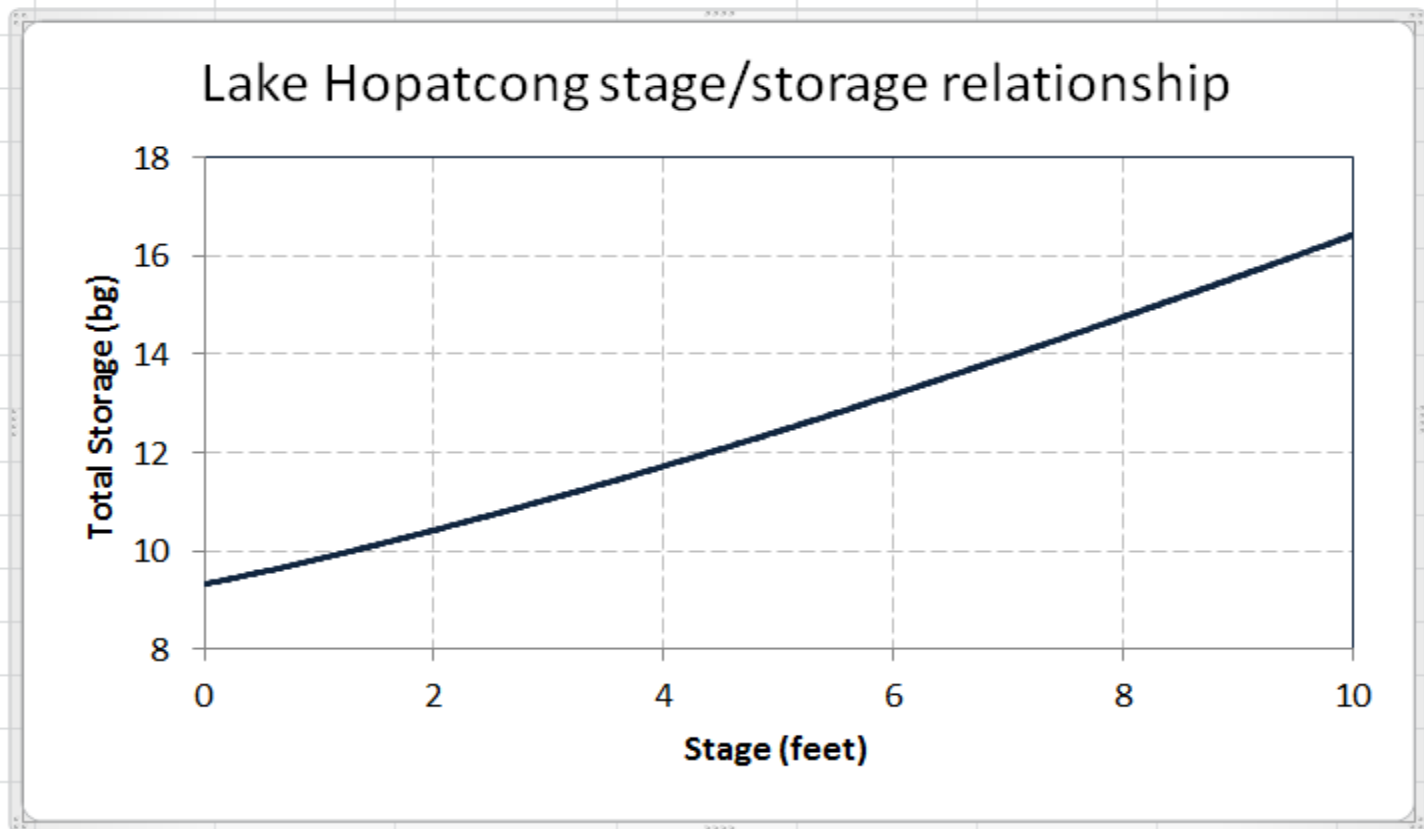


Monthly Low Flow Frequency Analysis



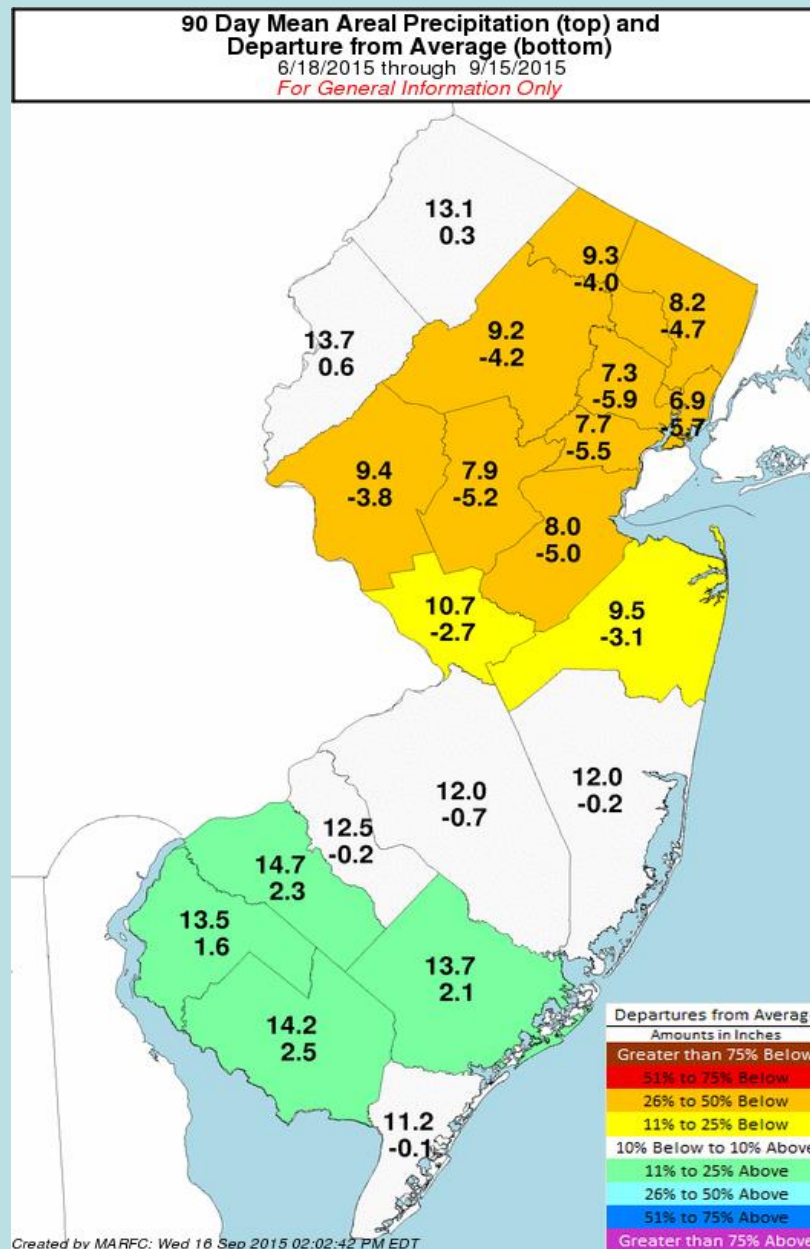
2012 Lake Hopatcong Water Levels & Stream Flow





stage (ft)	drawdown (inches)	storage (bg)	% change
9.0	0	15.58	0%
6.8	26	13.93	11%
4.0	60	11.72	25%

Note – USGS storage values (7.459 bg) based upon “usable volume” – the water between sill of the release gates and spillway, 8.12 bg of storage remains below sill of release gate



Downstream Concerns

- Dilution for MSA discharge
- Historic uses at the Morris Canal and Waterloo Village
- Wild and Scenic River designation of the Musconetcong River
- Recreational uses
- Ecosystem evolved since 1925
- Fisheries and wildlife concerns

Surface Water Quality Standards



Classification based on fish species present
Trout are an important indicator of stream health

Surface Water Quality Standards

- **Trout Production** – supports trout reproduction (young-of-the-year trout documented)
- **Trout Maintenance** – support trout and/or trout associated species year round
- **Non-trout** – Does not support trout or trout associated species



Musconetcong River

- Entire length classified **Trout Maintenance** since stream classifications incorporated into SWQS in 1981
- Section Saxton Lake to Delaware River, upgraded to **Category 1** in June 2008 presence of threatened species and exceptional ecological significance

Musconetcong River

- (Hackettstown) – Lake Hopatcong dam to and including Saxton Lake, except tributaries described separately **FW2-TM**
- (Saxton Falls) – Saxton Lake to Delaware River, including unnamed and unlisted tributaries **FW2-TM(C1)**



NATIONAL WILD AND SCENIC DESIGNATION (2006)

Saxton Falls to Route 46 bridge

3 miles scenic

Kings Highway to Musconetcong Gorge RR
tunnel 20.1 miles recreational

Surface Water Quality Standards

- Trout Maintenance Temperature Criteria
 - Not exceed 25°C (77°F) Daily Maximum
 - Not exceed 23°C (73°F) seven day rolling average



LAKE HOPATCONG

- Lakes classified by suitability to support trout year round
- Summer water quality measurements
 - Temperatures (less than 21°C)
 - Dissolved oxygen (greater than 4 mg/l)
- Lake Hopatcong (TM)
- Lake Musconetcong (NT)

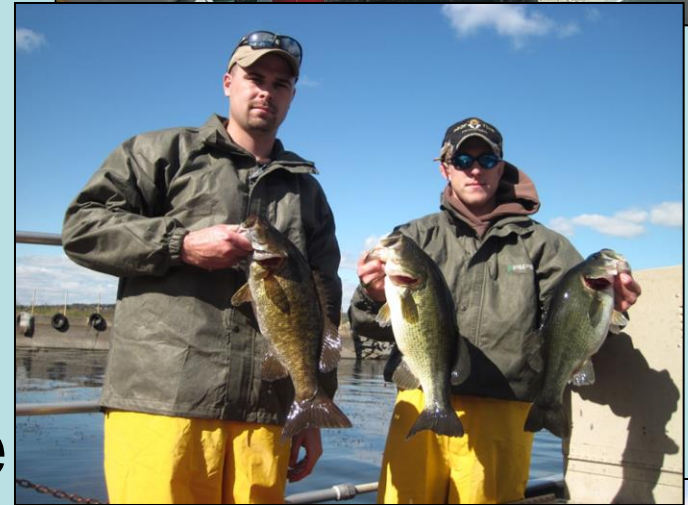
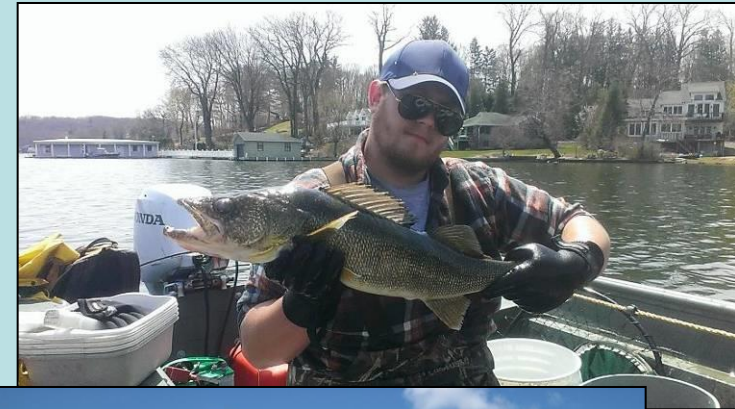
LAKE HOPATCONG

- Lake is managed as a year round warmwater fishery
- Stocked as a seasonal trout fishery
- Stocked with Muskies, Walleye, Hybrid Striped Bass, Channel Catfish
- 2013-2014 Fisheries Inventory Completed



LAKE HOPATCONG

- 28 Species
- 9,647 fish collected
- Electrofishing, trap nets
Gill nets, seining
- Fishery is in good shape
 - Increase abundance in LMB
 - Shift length frequency of Walleyes



Water Level Management Plan

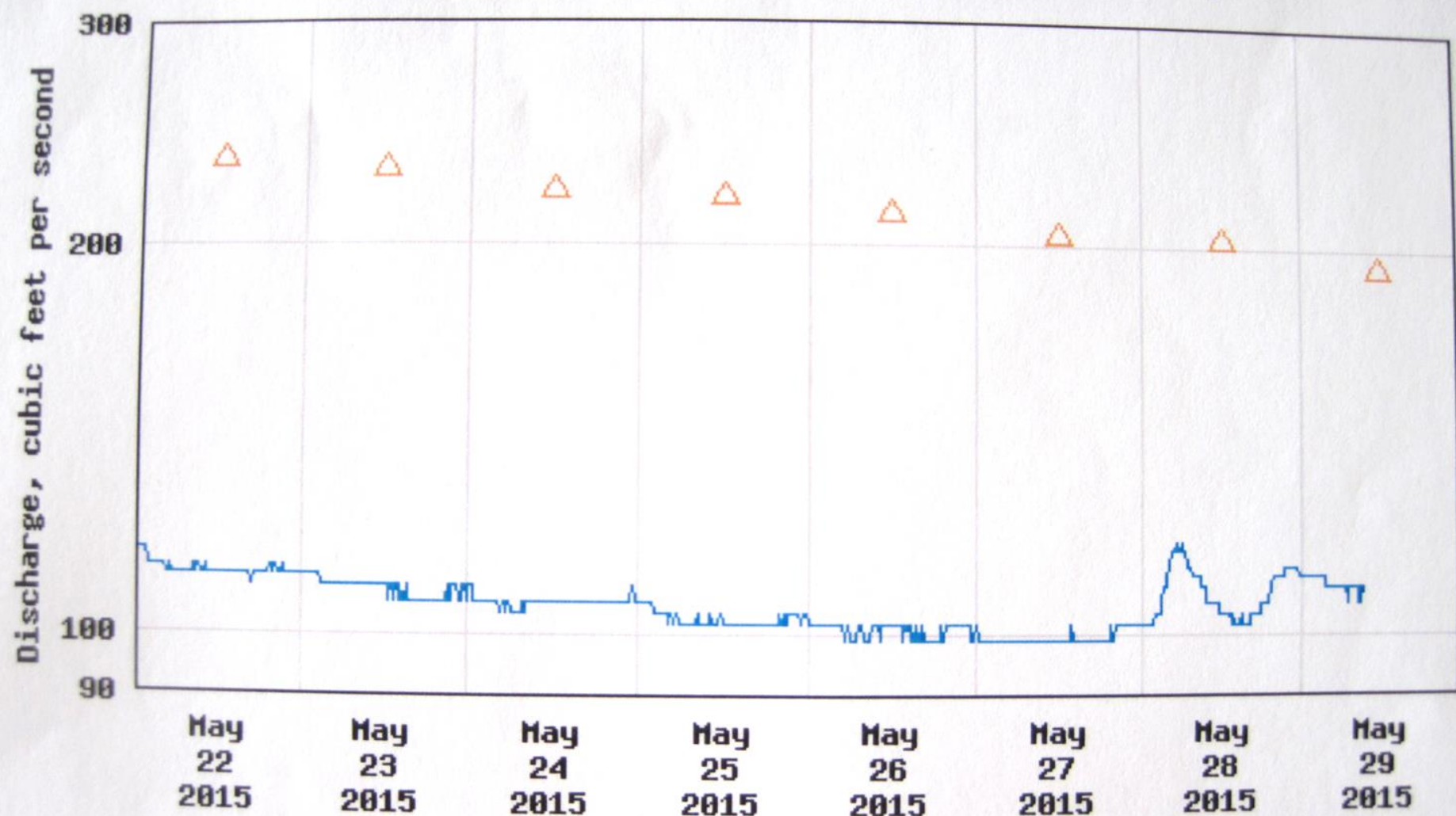
- **Reductions to 12 cfs outflow***
 - Local conditions pose imminent danger to life and property
 - Drought warning declared
 - Spring precipitation for any preceding three months less than 7 inches
 - Summer lake levels below 8 ft.

***Provided downstream impacts are minimal**

Factors:

- **Stream flow**
- **Stream temperatures**
- **Dissolved oxygen**
- **Weather forecast**

USGS 01457000 Musconetcong River near Bloonsbury NJ



---- Provisional Data Subject to Revision ----

△ Median daily statistic (96 years) — Discharge

Stream Temperatures

	Location	May 18	May 29	June 4	June 11	July 1	July 27	Aug 28	Sept 16
1	Musconetcong River, imm. below dam	20.5°C 68.9 °F	20.3°C 68.5°F	19.7°C 67.4°F	22.1°C 71.8°F	22.5°C 72.5°F	26.7°C 80.1°F	24.1°C 75.4°F	23.2°C 73.8°F
2	Musconetcong River, below Lakeside Blvd	20.4°C 68.7 °F	20.5 °C 68.9°F	19.8°C 67.6°F	22.2°C 72.3°F	22.7 °C 72.9°F	26.8°C 80.4°F	24.5°C 76.1°F	23.5°C 74.3°F
3	Musconetcong River, Trudy Court – wetland area	19.9°C 67.8 °F	20.3 °C 68.5°F	19.4°C 66.9°F	23.4°C 74.1°F	23.4°C 74.1°F	26.5°C 79.7 °F	25.6°C 78.1°F	24.9°C 76.9°F
4	Musconetcong River, Willow Street	19.4°C 66.9°F	21.8 °C 71.2°F	18.1°C 64.6°F	22.6°C 72.7°F	22.4°C 72.3°F	25.4°C 77.7 °F	24.7°C 76.5°F	20.5°C 68.9°F
5	Musconetcong River, below Lk Musconetcong,	21.9°C 71.4°F	23.0°C 73.4°F	20.3°C 68.5°F	23.8°C 74.8°F	22.5°C 72.5°F	26.9°C 80.4°F	25.2°C 77.4°F	23.6°C 74.5°F
6	Tributary stream to wetlands below Lk Hopatcong @ Brooklyn – Stanhope Rd bridge	15.8 °C 60.4°F	19.8°C 67.6°F	15.5°C 59.9°F	19.7°C 67.5°F	19.5°C 67.1°F	21.6°C 70.9°F	18.9°C 66.0°F	18.4°C 65.1°F

Red font denotes exceedence of 25°C (77°F) daily max. limit for Trout Maintenance

Stream Temperatures

	Location	May 18	May 29	June 4	June 11	July 1	July 27	Aug 28	Sept 16
1	Musconetcong River, imm. below dam	20.5°C 68.9 °F	20.3°C 68.5°F	19.7°C 67.4°F	22.1°C 71.8°F	22.5°C 72.5°F	26.7°C 80.1°F	24.1°C 75.4°F	23.2°C 73.8°F
2	Musconetcong River, below Lakeside Blvd	20.4°C 68.7 °F	20.5 °C 68.9°F	19.8°C 67.6°F	22.2°C 72.3°F	22.7 °C 72.9°F	26.8°C 80.4°F	24.5°C 76.1°F	23.5°C 74.3°F
3	Musconetcong River, Trudy Court – wetland area	19.9°C 67.8 °F	20.3 °C 68.5°F	19.4°C 66.9°F	23.4°C 74.1°F	23.4°C 74.1°F	26.5°C 79.7 °F	25.6°C 78.1°F	24.9°C 76.9°F
4	Musconetcong River, Willow Street	19.4°C 66.9°F	21.8 °C 71.2°F	18.1°C 64.6°F	22.6°C 72.7°F	22.4°C 72.3°F	25.4°C 77.7 °F	24.7°C 76.5°F	20.5°C 68.9°F
5	Musconetcong River, below Lk Musconetcong,	21.9°C 71.4°F	23.0°C 73.4°F	20.3°C 68.5°F	23.8°C 74.8°F	22.5°C 72.5°F	26.9°C 80.4°F	25.2°C 77.4°F	23.6°C 74.5°F
6	Tributary stream to wetlands below Lk Hopatcong @ Brooklyn – Stanhope Rd bridge	15.8 °C 60.4°F	19.8°C 67.6°F	15.5°C 59.9°F	19.7°C 67.5°F	19.5°C 67.1°F	21.6°C 70.9°F	18.9°C 66.0°F	18.4°C 65.1°F

Red font denotes exceedence of 25°C (77°F) daily max. limit for Trout Maintenance

2015:

- **Spring**

- Despite significant snow fall, early spring flows were short lived, below average precipitation lead to low stream flows

- **Early June**

- Drop in air temps, localized rain event
- Outflow reduced to 8 cfs for several days
- Dry forecast, return of warm temps

- **Summer**

- Continued warm, dry weather

Hopatcong State Park Water Out Flow Operations

Gate House

Constructed in 1924



Pump



Measuring System





Lake Hopatcong Lake Reading

July 2015

July 2015 Hopatcong - Lake Readings
All readings are as of 7:00am unless otherwise noted

Day	Weather	Temp	Fountain	Gate	Well (river)	Lake	Precip	Other
1	cloudy	66	closed	5"	1.30	8.54	0.13	
2	clear	59	"	"	1.30	8.54		
3	clear	57	"	"	1.30	8.54		
4	cloudy	65	"	"	1.30	8.54		
5	clear	60	"	"	1.30	8.54	0.11	
6	clear	63	"	"	1.30	8.54		
7	cloudy	74	"	"	1.30	8.52		
8	cloudy	71	"	"	1.30	8.51	0.02	
9	rain	65	"	"	1.30	8.57	0.69	
10	clear	67	"	"	1.30	8.63	0.47	
11	clear	61	"	"	1.30	8.62		
12	clear	65	"	"	1.30	8.61		
13	clear	66	"	"	1.30	8.59		
14	cloudy	66	"	"	1.29	8.57		
15	rain	70	"	"	1.30	8.60	0.01	
16	clear	56	"	"	1.30	8.67	0.14	
17	cloudy	59	"	"	1.30	8.63		
18	cloudy	70	"	"	1.30	8.61		
19	clear	67	"	"	1.30	8.62	0.14	
20	clear	72	"	"	1.30	8.60		
21	clear	67	"	"	1.30	8.58		
22	clear	61	"	"	1.30	8.60	0.09	
23	clear	55	"	"	1.30	8.56		
24	clear	56	"	"	1.30	8.54		
25	clear	56	"	"	1.30	8.51		
26	cloudy	70	"	"	1.30	8.48		
27	cloudy	70	"	"	1.30	8.49	0.30	
28	clear	68	"	"	1.30	8.47		
29	clear	65	"	"	1.29	8.45		
30	cloudy	73	"	"	1.29	8.42		
31	clear	62	"	"	1.30	8.47	0.70	
						total	2.80"	
						avg	4.57"	-1.77